## **CONTENTS**

# MATHEMATICAL MODELLING IN SCIENCE AND TECHNOLOGY

THE SIXTH INTERNATIONAL CONFERENCE

Objective and Organizing Committee	xv
Foreword	xvii
Ervin Y. Rodin and Xavier J. R. Avula	
PLENARY LECTURES	
Are economic forecasts any good?	
Murray L. Weidenbaum and Stephen C. Vogt	1
Design of thyroxine replacement therapy with SCoP and SCoPfit	
Michael C. Kohn	6
Population system control	
Jian Song, Deyong Kong and Jingyuan Yu	11
Introduction of plenary speaker Dr Jeffrey Marsh	17
Ronald G. Evens	17
MODELLING CHEMICAL SYSTEMS I	
Statistical modeling of fluid-solid reactions in porous media	
Muhammad Sahimi, Theodore T. Tsotsis and George R. Gavalas	19
Use of preconditioned bi-conjugate gradient method in modeling two-phase fluid flow in porous media	
David H. Anderson and Ajit V. Sapre	22
Modelling hysterisis phenomena in systems of multiple slits: application of the principle of a minimum	
rate of entropy production at steady state	
Richard A. Holub, P. A. Ramachandran and M. P. Duduković	26
Variable parameter model of the continuous flow vessel  Antti J. Niemi	22
Determination of binary gas diffusion coefficients in spherical porous media by steady and unsteady-	32
state analysis of single pellet reactor data	
S. P. Waldram, P. L. Mills and M. P. Duduković	38
Monte Carlo simulations of liquid flow patterns in trickle-beds	-
Badreddine Ahtchi-Ali and Henrik Pedersen	43
MODELLING ON PARALLEL COMPUTERS	
Subchannel analysis on advanced computer architectures	
John A. Turner and J. Michael Doster	47
Plasma particle simulations on the Mark III Hypercube	
Paulett C. Liewer, Viktor K. Decyk, John D. Dawson and Geoffrey C. Fox	53
Numerical algorithms for the hypercube concurrent processor	
Jean E. Patterson, Farzin Manshadi, Ruel H. Calalo, Paulett C. Liewer, William A. Imbriale and	
James R. Lyons	55
OCEAN ACOUSTIC MODELS FOR NAVY APPLICATIONS	
A model of underwater acoustic propagation	
Eutiquio C. Young and Ding Lee	58
Three-dimensional sound fields in the ocean	
Michael J. Buckingham	62
Performance modeling for hydrophone arrays	
Ronald R. Lambert and Steven F. Magruder	67
A finite element model for ocean acoustic propagation	70
Joseph E. Murphy and Stanley A. Chin-Bing  An N-th order Neumann series solution to the Helmholtz surface integral equation for scattering from	70
rough interfaces including shadowing, penetration, and sequential surface scattering	
Richard S. Keiffer and Michael F. Werby	75

Some numerical approaches to describe acoustical scattering from objects in a waveguide Guy V. Norton and M. F. Werby	81
NUMERICAL METHODS IN WATER RESOURCES	
Storm surge simulation using new FEMA model	
Joseph N. Suhayda and Myron H. Young	87
Vertical slice numerical model for density-driven coastal currents	
Myron H. Young and Stephen P. Murray	96
MATHEMATICAL MODELLING IN ELECTRO-OPTICS I	
Mathematical modeling of beam reflection, transmission and trapping at nonlinear optical interfaces	
A. Aceves, J. V. Moloney and A. C. Newell	101
Bistable solitons of highly-nonlinear Schrödinger equations in nonlinear optics  A. E. Kaplan	106
Bistable solitons: optical switching and large amplification behaviour	100
Richard H. Enns, David M. McAvity and Sada S. Rangnekar	112
Two numerical techniques of the analysis of complex dielectric waveguides	
Joseph L. Levy	118
S-SYSTEMS	
Efficient solution of nonlinear models expressed in S-system canonical form	
Douglas H. Irvine	123
Alternative S-system representations for reversible biochemical pathways	100
Albert Sorribas Estimation and simulation of S-systems	129
Thomas Johnson	134
Recasting nonlinear models as S-systems	134
Eberhard O. Voit	140
MATHEMATICAL MODELLING IN HEALTH RISK ASSESSMENT	
The use of mathematical models in carcinogenesis risk assessment Ralph L. Kodell	146
BIOMECHANICS OF HEART VALVES	
A nonlinear finite element stress analysis of the leaflets of a prosthetic heart valve	
Siddik Ozpetek and C. Barclay Gilpin	152
A Bayes model for automatic detection and quantification of bioprosthetic valve degeneration L. G. Durand, M. Blanchard, H. N. Sabbah, M. S. Hamid, S. R. Kemp and P. D. Stein	158
CELL MODELS	
Cellular aging rates and biochemical reaction rates	
Pierre M. Auger	164
COMPUTATIONAL FLUID DYNAMICS	
Two-dimensional multifrequency instability suppression via surface mass transfer: linear theory and its application	
W. W. Bower, A. Pal, A. B. Cain and G. H. Meyer	170
A computational model for a symmetric turbulent wake Sastry S. Munukutla	175
Numerical simulation of three phase porous flow under shock conditions	1/3
E. J. Kansa	180
MAGNETICS	
Numerical techniques applied to magnetic recording	
Edward Della Torre and György Kádár	186
Mesh generation for modelling in magnetics	
Zoltan J. Cendes, Edward C. Smetak and David Shenton	192

The extraction of engineering parameters from mathematical models of electromagnetic devices  D. A. Lowther	107
Mathematical modeling of seed mixing in magnetohydrodynamic power generators	197
Shawky E. Shamma	202
TOPICS IN THEORY OF THE ANALYTIC HIERARCHY PROCESS	
Opportunities and limitations of AHP in multiobjective programming  David L. Olson	206
GRAPH THEORETIC AND OTHER MODELS	
Applications of the theory of hypergroups	
Rupert Lasser On the galactic number of a hypercube	210
Michael Fellows, Mark Hoover and Frank Harary	212
Spanning subgraphs of a hypercube II: double starlike trees	216
Frank Harary and Martin Lewinter  Modelling properties of spanning trees: diameter and distance sum	210
Michael J. Plantholt	218
Embeddings in hypercubes  Marilynn Livingston and Quentin F. Stout	222
Model reduction with alternatives to the standard Hankel matrix	222
Stefan Mittnik	228
MATHEMATICAL MODELLING IN CARDIOLOGY	
Models and concepts of diastolic mechanics: pitfalls in their misapplication	
Ares Pasipoularides and Israel Mirsky	232
An expert system to simulate fuzzy phenomena in cardiac electrophysiology	
Willem R. M. Dassen and William P. S. Van Braam Left ventricular myocardial stiffness	235
Peter B. Kurnik, Michael R. Courtois and Philip A. Ludbrook	239
POPULATION MODELS I	
Epidemiologic modelling of diseases—a case example using Schistosoma and Trypanosoma T. Habtemariam, A. Ghartey-Tagoe, E. Mamo and V. Robnett	244
POPULATION MODELS II	
Saturation processes	
C. O. A. Şowunmi	250
THE P-VERSION OF THE FINITE ELEMENT METHOD: THEORY AND APPLICATIONS	
On the use of estimated structural equations for prediction: some empirical results	
Saleh Amirkhalkhali and Abbas Naini	253
Computation of eigenvalues and eigenfunctions for the stress singularity in a composite wedge Xingren Ying and I. Norman Katz	256
APPLICATIONS OF THE AHP	
An expert support system for R&D project selection  Matthew J. Liberatore	260
Using analytic hierarchies for consumer research and market modeling  Rick G. Schwartz and Shmuel S. Oren	266
MULTIPLE OBJECTIVE DECISION MAKING MODELS AND APPLICATIONS	
Using the Analytical Hierarchy Process to select a financing instrument for a foreign investment	
Aboubaker S. Meziani and Farahmand Rezvani	272
Multi-criteria decision making approach to computer software evaluation: application of the Analytical	
Hierarchy Process	276

Model selection and ranking: an AHP approach to forecasts combination  Ouang Phuc Duong	282
MODELLING AEROELASTIC PHENOMENA	
Analytical modeling of helicopter static and dynamic induced velocity in GRASP	
Donald L. Kunz and Dewey H. Hodges	286
Modeling of unsteady aerodynamics for rotary-wing aeroelasticity	
David A. Peters	293
MATHEMATICAL MODELLING IN ELECTRO-OPTICS II	
Numerical modelling of laser instabilities	
Lee W. Casperson  Travelling wave treatment of mode-locked semiconductor lasers	298
Jianguo Chen and Dayi Li	303
Modelling the gain of a diode-pumped solid state laser	
Richard C. Mayer and Raymond H. Hsu	308
FINITE ELEMENT MODELLING AND SOLUTION OF INFINITE REGION ELECTROMAGNETIC PROBLEMS	
The surface projection approach to vector field calculations  Henry Hurwitz Jr	313
MODELLING PROBLEMS IN LARGE ELECTRIC-POWER SYSTEMS	
Applications of integral manifolds to power system studies	
P. W. Sauer  Application of Levinson algorithm for fault calculations in high phase order transmission systems	317
A. Chandrasekaran and R. P. Broadwater	321
A multi-level graded-precision model of large scale power systems for fast parallel computation G. Huang, A. Abur and W. K. Tsai	325
BIOMECHANICS I	
Stress singularities in the elastic analysis of the tibial component of orthopedic implant  A. B. Strickland and T. P. Andriacchi	331
Head-spine model evaluation of energy absorbing effectiveness of two helicopter crew seats	
Eberhardt Privitzer  A mathematical taxonomy to evaluate the biomechanical quality of the human foot	335
Philip H. Demp	341
NEURAL MODELS I	
A hierarchical model of neocortical synaptic organization J. P. Sutton, J. S. Beis and L. E. H. Trainor	346
J. F. Sutton, J. S. Dels and D. E. H. Hamor	340
CELLULAR AUTOMATA TO APPLICATION	
Information processing in cellular automata	25
Jonathan Doner  Bus versus cellular automata, and ultimate limitations of parallel processing	351
Jerome Rothstein	35
The emptiness problem for CA limit sets	26
Karel Culik II and Sheng Yu The power of totalistic cellular automata and totalistic systolic networks	36
Karel Culik II	36
MODELLING AND SIMULATION OF CHEMICAL ENGINEERING SYSTEMS II	
Sequential bifurcations, maximum multiplicity, and chaos for a first order reaction	
David G. Retzloff, Paul C-H. Chan and B. Youssef Bisbis	37
Mathematical modelling of chemical engineering systems by finite element analysis using PDE-PROTRAN	
P. L. Mills and P. A. Ramachandran	37

Interfacial turbulence: mass transfer—gas/gas	
Winston Khan Estimating functional relationships in a macrosociological model	380
Richard Bronson, Chanoch Jacobsen and James Crawford	386
A production forecasting model for gas wells	
K. Aminian and S. Ameri	391
The Bayesian learning model of expectations as a solution to the Lucas critique: some empirical evidence	201
J. A. Mills	396
MACROECONOMETRIC MODELLING	
Modelling of R & D induced product innovation	
Stephen L. Chan and Fredric Raines	402
KNOWLEDGE BASED GUIDANCE AND CONTROL	
Declarative knowledge to use declarative knowledge	
Jacques Pitrat	408
A multiple-objective optimal exploration strategy	412
George Christakos and Ricardo A. Olea	413
BIOMECHANICS II	
The statistical use of Fourier descriptors	
Charles B. Davis and Robert M. Beecher	419
Strain energy based equilibrium model of lumbar spine	
Narayan Yoganandan, Joel B. Myklebust, Frank Pintar and Anthony Sances Jr	425
Mathematical modeling of the Hybrid III manikin head-neck structure  Brian J. Doherty and Jacqueline G. Paver	430
Simulation of body motion during aircraft ejection	450
Louise A. Obergefell and Ints Kaleps	436
Modeling of occupant-roof interaction in an automobile rollover	4.40
Narayan Yoganandan, A. Almusallam, Joel Myklebust and Anthony Sances Jr	440
CANCER MODELS	
A nonhomogeneous two-stage model of carcinogenesis	
W. Y. Tan and C. C. Brown	445
A mathematical model of survival in relation to age and sex of cancer patients	449
Jian C. Chang A mathematical model of tumor growth by diffusion	447
John A. Adam	455
THEORETICAL ISSUES OF BIOLOGICAL INTELLIGENCE: INFORMATION AND STRUCTURE	
Statistical mechanics of mesoscales in neocortex and in command, control and communications (C3)	457
Lester Ingber	457
NONLINEAR AND PHILOSOPHICAL ISSUES IN BIOLOGICAL MODELLING	
When is a mechanism not a mechanism? The network thermodynamic approach to complex systems D. C. Mikulecky	464
Analysis of diffusion problems in physiology	101
J. B. Garner	469
On the evolution of altruism in an age-structured population  Ying-Hen Hsieh	472
NONLINEAR STOCHASTIC DYNAMICAL SYSTEMS	
A software package for hidden Markov modelling	
Robert H. Baran	476
Steady state solution and convergence rate of time-dependent Markov chains of queuing networks	
K. P. Chung	481
On the solution of first order evolution problems in continuum physics  Ida Bonzani	480

## OPTIMIZATION OF BIOLOGICAL PROCESSES

A new numerical method applied to biomedical systems Y. Cherruault	490
Simulation and stability analysis for parameter dependent 2-dimensional models of air polluted forests	490
Wolfgang Metzler and Dieter Gockert	493
Model of social consciousness with applications to personal exchange and energy/environment decisions John A. Sorrentino Jr	499
MODELLING APPLICATIONS IN AGRICULTURAL ENGINEERING	
Combine model for grain threshing	
J. M. Gregory  Mathematical models describing the flow of granular material	506
C. B. Fedler	510
Engine model for mapping BSFC contours	E1 4
C. E. Goering and H. Cho The nitrogen loss in drained soils	514
Rameshwar S. Kanwar	519
Stochastic modeling of granular flow in seed sorting	
Carmine C. Balascio, Manjit K. Misra and Howard P. Johnson	523
LIE METHODS IN MATHEMATICAL MODELLING	
Difference equation models of differential equations	
Ronald E. Mickens Similarity solutions of nonlinear partial differential equations invariant to a family of affine groups	528
Lawrence Dresner	531
Lie group theory applied to the nonlinear Vlasov-Maxwell equations in one and three dimensions D. A. Roberts	535
D. A. Roberts	333
DEVELOPMENT AND IMPLEMENTATION OF OPTIMIZATION ALGORITHM FOR SMALL COMPUTERS	
Prototype simulation and animation on small computers  William Perrizo and Blair Koch	540
Introduction to S-systems and the underlying power-law formalism	340
Michael A. Savageau	546
Accuracy & error analysis of LP software on microcomputers	552
Bryant Bynum and Ramesh Sharda  The development of a microcomputer based system for vehicle routing and scheduling and its use for	332
solving spatial and temporal problems	
Lawrence D. Bodin and Daryl J. Salamone	558
MATHEMATICAL MODELLING AND ANALYSIS FOR THE AIR FORCE	
Mathematical models of electrohydraulic servovalves for fly-by-wire flight control systems	
Giovanni Jacazio and Lorenzo Borello	563
Mathematical modeling of liquid-rocket combustion instability  M. A. Farvin and John Peddieson Jr	570
Encoding images through transition probabilities	
Marc A. Berger	575
CONTROL THEORY	
Measuring drug performance with a new optimization algorithm William Conley and Harriet Wichowski	578
A simple approach to nonlinear estimation of physical systems	570
George Christakos	583
Toward optimal scaling in the Method of Abstract Forces for interactive multiple criteria optimization Roy J. Clinton and Marvin D. Troutt	589
An optimal repair cost limit policy for servicing warranty	509
D. N. P. Murthy and D. G. Nguyen	595
On the reduction of total uncertainty in measurements  Carlos Ford-Livene and Tadao Mukaihata	600
The same and the same same same same same same same sam	

## PHYSIOLOGICAL MODELS I

Fitting density functions and diffusion tensors to three-dimensional drug transport within brain tissue	
Yves Nievergelt	606
Analysis of the pharmacokinetic body transport function  J. M. van Rossum, G. van Lingen and R. A. A. Maes	(10
Mathematical modelling of the renal concentrating mechanism	610
Raymond Mejia	615
Physiologic modelling of MM creatine kinase isoforms	
Dana R. Abendschein, Héctor L. Fontanet, Joanne Markham and Burton E. Sobel	621
MODELLING IN DRUG DESIGN I	
Looking for buried treasures: the search for new drug leads in large chemical databases	
G. M. Maggiora, M. A. Johnson, M. S. Lajiness, A. B. Miller and T. R. Hagadone	626
A characterization of molecular similarity methods for property prediction	
Mark Johnson, Subhash Basak and Gerald Maggiora	630
A new approach to structure-activity using distance in ormation content of graph vertices, a study with phenylalkylamines	
G. Klopman, C. Raychaudhury and R. V. Henderson	635
On non-symmetry equivalence	
M. Randić, S. El-Basil and R. B. King	641
The use of mathematical logics in drug design	
W. J. Streich, S. Hübel and R. Franke	647
APPLICATIONS OF THE TAU METHOD TO PROBLEMS IN MATHEMATICAL MODELLING	
A survey of recent applications of the Tau Method to problems in mathematical modelling	
Eduardo L. Ortiz	652
Vector Collocation-Tau Method for linear partial differential equations	
John C. Mason and G. Oluremi Qlaofe	656
Quadrature solution of ordinary and partial differential equations	
G. Oluremi Olaofe and John C. Mason	661
On different formulations of the Tau Method	((7
Christian Cabos	667
Numerical solution of differential eigenvalue problems with variable coefficients with the Tau-Collocation Method	
K. M. Liu	672
Existence and uniqueness of solution of Bessel's nonlinear differential equation	0.2
A. Pham Ngoc Dinh	676
Numerical approximations of certain generalised integrals	
Ravindra Kumar	679
DEFENSE ANALYSIS	
From deterrence to defense: the strategic implications of SDI	
Steven J. Brams and D. Marc Kilgour	683
Instructional aid for tactical wargame model	
S. Ramgopal, B. T. Vikram Kumar, N. C. Shivaprakash and R. Vasudevan	689
Military modelling and computing: where do we go from here?	(02
Harriet H. Kagiwada	693
Modification of the viscosity solution and its application	600
Leszek Saturnin Zaremba	699
MODELLING SOLID MATERIAL BEHAVIOR	
Mathematical modelling of materials behaviour	
Josef Betten	702
The modelling of aging processes in aerospace materials	
D. T. Wadiak	709
A mathematical model for nonlinear stress analysis of sandwich plate units	713
venappa t. 198 and t. V. Grina vanappan	/1.

A simple computational cumulative damage model for microcracking	
Stuart McHugh On the characteristics of bolted joints of the orthotropic materials (Part I)	720
Debabrata Ray and N. R. Chakraborty	727
On the characteristics of bolted joints of the orthotropic materials (Part II)  Debabrata Ray and N. R. Chakraborty	730
SYSTEM THEORETIC MODELS IN ECONOMIC MODELLING	
A note on integrating the input price distortion policy into the general equilibrium impact analysis Fengshiuan (Florence) Pan Shu	734
Can the world be studied in the viewpoint of systems?? Yi Lin	738
The coding theorem and ordinary least-squares models in economics William D. O'Neill	743
HEAT TRANSFER AND FLUID MECHANICS	
Non linear diffusion equations in heterogeneous media	747
Michel Artola A mathematical model of impulse jet mechanism K. F. Teng	747 751
INFORMATION SYSTEMS	
A performance model of database systems under arbitrary data access distribution	
Mukesh Singhal and Yelena Yesha Stochastic models of information obsolescence	754
James P. Coughlin and Robert H. Baran Multimulti-ordered telematics: Tele((Comm)Infor)Matics	760
Robert K. Krzywiec  Multimulti-graphs of Programable 1. Programing Languages: FORTRAN 77	766
Robert K. Krzywiec	772
PHYSIOLOGICAL MODELS II	
Activation dynamics for a distribution-moment model of skeletal muscle	778
Shiping Ma and George I. Zahalak Pharmacokinetic modeling of warfarin: a multifactorial approach	783
Walter D. Wosilait and Richard H. Luecke  Data sensitivity of estimated parameters in a seven-compartment model for pharmacokinetics	103
F. W. Schultz and J. A. Mulder  Application of multivariate autoregressive modelling for analysis of immunologic networks in man	786
Takao Wada, Hirotugu Akaike, Haruyasu Yamada and Eiichi Udagawa Mucus transport in the lung	792
Manju Agarwal and J. B. Shukla	797
MODELLING IN CARDIOLOGY	
Finite element approximation of potential gradient in cardiac muscle undergoing stimulation  Wanda Krassowska, David W. Frazier, Theo C. Pilkington and Raymond E. Ideker  Measurement of myocardial blood flow with positron emission tomography: correction for count	801
spillover and partial volume effects Pilar Herrero, Joanne Markham, Donald W. Myears, Carla J. Weinheimer and Steven R. Bergmann	807
Computer simulation of ventricular fibrillation  Pierre M. Auger, Alain Bardou, Alain Coulombe and Jean Degonde	813
An animated, non-compensating pulmonary model for teaching ventilation and perfusion relationships to medical students	
Bruce L. Johns, Alan D. Scott and David J. Thuente	823
MODELLING OF BRAIN SYSTEMS	

828

Wave disturbances in laminar nerve networks

J. B. Willis

Information transfer in the cortex	
T. Triffet and H. S. Green	832
MODELLING IN DRUG DESIGN II	
An approach to modeling the mutagenicity of nitroarenes	
M. Randić, S. C. Grossman, B. Jerman-Blažič, D. H. Rouvray and S. El-Basil QSAR approach to the prediction of melting points of substituted anilines	837
J. C. Dearden and M. H. Rahman	843
MODELLING OF LARGE SCALE SYSTEMS	
Partitioning and parallel algorithms for kidney models	
T. M. Hagstrom and R. P. Tewarson	847
A stiff ODE solver for use in solving two-dimensional reaction—diffusion problems  Douglas E. Salane	850
New methods for boundary value problems	0.55
Robert E. Kalaba and Anthony S. Wexler Simulation of integrated circuits: numerical techniques	855
Peter Lory	858
Modelling atmospheric water vapor fluctuations for radio interferometry	
R. N. Treuhaft and G. E. Lanyi	864
MATHEMATICAL MODELLING PROBLEMS IN AEROSPACE	
Simulation of multiple aircraft information, communication, and decision in air combat	
Stephen L. Chan and Barbara J. Vogel	865
Prediction of loaded airfoil unsteady aerodynamic gust response by a locally analytical method  Hsiao-Wei D. Chiang and Sanford Fleeter	871
Locally analytical prediction of the steady inviscid incompressible flow through an airfoil cascade	
Hsiao-Wei D. Chiang and Sanford Fleeter  Recent work using Volterra series as a methodology to analyze nonlinear aircraft dynamic propertie	877
W. T. Baumann, T. L. Herdman, H. Stalford and C. F. Suchomel	883
MATHEMATICAL MODELLING IN NATURAL RESOURCES ECONOMICS	
Dynamic duality in resource economics: theory and empirical usefulness Pierre Lasserre	889
Ore quality selection and the supply response to nonrenewable resource taxation  Jeffrey A. Krautkraemer	894
When more isn't better: information and common-property resources	
Joseph Swierzbinski  A comparison of Bertrand and Cournot equilibrium outcomes in a differentiated nonrenewable	899
resources duopoly	
Gérard Gaudet and Michel Moreaux	903
Effects of ecological and environmental gradients on coexistence of interacting species	907
J. B. Shukla, O. P. Misra, S. Gakkhar and M. Agarwal  Effect of pollution and industrial development on degration of biomass-resource: a mathematical mode	
with reference to Doon Valley	
J. B. Shukla, O. P. Misra, M. Agarwal and A. Shukla	910
DEVELOPMENT AND IMPLEMENTATION OF OPTIMIZATION ALGORITHMS FOR SMALL COMPUTERS	
Optimizing subcase solutions for (M, N)-transitivity  Alfred J. Boals and Kenneth L. Williams	914
An optimal data allocation model for distributed databases	717
Dalia Motzkin	920
TECHNOLOGICAL SYSTEMS AND MODELLING	
A mathematical model for plasto-hydrodynamic drawing of narrow strips	
G. R. Symmons, A. H. Memon and M. S. J. Hashmi	926
Track irregularity limits from consideration of track-vehicle interaction	037

A data focusing algorithm with monotone regression and positive semi-definite constraint features  Marvin D. Troutt	930
Estimation of the linear programming technological coefficient matrix by a principle of maximum efficiency	
Marvin D. Troutt	94
Vehicle suspension optimization P. Pintado and F. G. Benitez	94
A computer simulation of a multiple track rail network Samuel M. Graff and Peter Shenkin	950
Analysis of sintering process by the mathematical model  Juzo Shibata	95
Development of parameters of multinomial logit models  Snehamay Khasnabis and Michael J. Cynecki	96
Interaction factors in synchronous machine modelling  K. A. S. Alukaidey and E. H. T. El-Shirbeeny	969
SIMULATION AND MODELLING	
Continuous time stochastic compartmental models of discrete populations	
Richard L. Patterson  Methods of nonequilibrium statistical mechanics in molecular simulations	975
Miroslav Grmela	979
Simulation of rheological properties of polymeric fluids  J. Stastna and D. De Kee	983
A mathematical model and simulation of frequency hopping interferences to FM systems	70.
Ghulam H. Raz Stationarity in models of successive stochastic phenomena	988
Michael Tortorella	994
Adaptive transversal filter modeling and simulation for telecommunications  W. E. Mattis	1000
SOLID MECHANICS	
Computer-aided appreciation of bridge-track-vehicle interaction	
Sharat K. Sinha	1000
Modelling, analysis and testing of dissipative beam joints-experiments and data smoothing	
Goong Chen, Steven G. Krantz, David L. Russell, C. Eugene Wayne, Harry H. West and Jianxin Zhou Modification of Swift criterion by damage mechanics and its application to theoretical analysis of forming limit	
Zhirong Guo and Hui jun Tan	1013
The effect of energy dissipation due to friction at the joint of a simple beam structure	
Robert P. Donnelly Jr and Ronald L. Hinrichsen	1022
Nonlinear deformations of clamped annular membranes subjected to uniformly distributed axisymmetric loading	1000
F. W. Workman, Joseph D'Costa and Ajit D. Kelkar	1028
RADIATION MODELLING	
Combining plans in radiotherapy treatment planning  Yair Censor, Martin D. Altschuler, William D. Powlis and Morton M. Kligerman	102
Response-surface model for organ dysfunction after protracted irradiation	103:
B. R. Scott  Local stem cell depletion model for radiation myelitis	1038
Robert J. Yaes and André Kalend	104
On a limited angle model for CT scan	
Pablo M. Salzberg and Carlos Steffens	104
MODELLING NAVAL OPERATIONS	
Acoustic source bearing modeling in shallow water waveguides	100
Er-chang Shang and Yun-yu Wang The optimality of radial flight	105
Peter P. Andre	105

## MATHEMATICAL MODELLING IN ENVIRONMENTAL DECISION-MAKING

Technical modeling for policy making: integrated modeling of a large environmental system	
Ronald J. Marnicio and Edward S. Rubin	1059
Analysis of turbulent dense jets discharged to quiescent uniform or stratified ambients	
I. K. Madni and S. Z. Ahmad	1064
Optimization modeling for capacity planning of production facilities and alternative facilities with consumable capacity	
Brian W. Baetz and Eric I. Pas	1069
Predicting THM concentration in treated water with highly correlated data	
Paul J. Ossenbruggen, Marie Gaudard and M. Robin Collins	1073
Predicting the probability of contamination at groundwater based public drinking supplies Jailyn A. Brown and William P. Darby	1077
BOUNDARY ELEMENT TECHNIQUES IN MATHEMATICAL MODELLING	
Probabilistic modelling of existing structures for dynamic analysis	
Tai-Yan Kam	1083
MATHEMATICAL MODELLING IN EDUCATION	
Mathematical modelling in secondary schools	1000
Georgeann M. Kepchar and Thomas E. Yager	1087
COMPUTATIONAL MODELLING	
Conservation laws for systems with memory	
Angelo Morro and Giacomo Caviglia	1090
A model for the dynamics of flexible chain systems	
Angelo Morro and Mauro Benati	1093
Estimation of variance and covariance components in linear models containing multiparameter matrices	
John Jones Jr and Chiewchar Narathong	1097
Decisional data and the Principle of Maximum Efficiency Estimation	
M. Diane Pettypool and Marvin D. Troutt	1101
Recent improvements to Data Envelopment Analysis	
M. Diane Pettypool and Marvin D. Troutt	1104
Generating subroutine codes with MACSYMA	***
Megan Florence, Stanly Steinberg and Patrick Roache	1107
Model creation and validation using bispectral estimation	1110
Ernest G. Zenker Jr	1112
Computation with error injection  KY. Fung and Brian D. Goble	1116
k1. rung and brian D. Gobie	1110
ROBOTICS AND ENGINEERING MODELLING	
Validation of single scatter model for backscatter density gauges	
I. A. Henderson and J. McGhee	1122
A non-linear charge control model for symmetrical pin diodes	
J. McGhee, I. A. Henderson and I. Hulley	1128
Shock stability analysis for parabolized Navier-Stokes equations	
Douglas D. Cline and Graham F. Carey	1133
ENGINEERING SYSTEMS AND METHODOLOGY	
Steady-state analysis of three-phase bridge converter supplying an active load	
Yaozhong Xu, V. I. John and G. E. Dawson	1138
Mathematical modeling of planar mechanisms with compliant joints	
Ashraf A. Zeid	1144
Mathematical models used for adaptive control of machine tools	
Patricia A. S. Ralston and Thomas L. Ward	1151
Generalized least squares innovation representation	
I. Bencsik and Gy. Michaletzky	1156

Viscoelasticity of photopolymer plates and ink hydrodynamics in modelling flexographic printing	
Srinivas K. Mirle and A. C. Zettlemoyer	1162
Modeling of brushless dc drive systems with pulse-width modulated excitation	
René Spée, Alan K. Wallace and Joel Davis	1166
A continuous review inventory system with semi-Markovian demands	
S. Kalpakam and G. Arivarignan	1172
Simulation of mechanical drives with generalized power losses	
Francesco De Bona and Giovanni Jacazio	1178
A lower bound solution for the plane strain extrusion forging process	
M. S. J. Hashmi	1183
MEDICAL SIMULATION AND MODELLING	
On active linear compartments	
Marek Kimmel and Ovide Arino	1189
The determination of nutritional requirements: a mathematical modeling approach	
L. Preston Mercer and Steven J. Dodds	1195
A computer simulation model for cellular migration in planarians	
Richard V. Solé, Jordi Ocaña and Jaume Baguñà	1201
An interactive support software for design and use of simulation packages	
Roderic Guigó and Jordi Ocaña	1205
Bayesian fitness estimation in simulation studies	
Maria del C. Ruiz de Villa and Jordi Ocaña	1208
Author Index	ī



